

REMARKS

Entry of the foregoing, reexamination and reconsideration of the subject application are respectfully requested in light of the amendments above and the comments which follow.

As correctly noted in the Office Action Summary, claims 1 and 5-14 were pending. By the present response, claim 1 has been amended, and claims 13-14 canceled. Thus, upon entry of the present response, claims 1 and 5-12 remain pending and await further consideration on the merits.

Support for the foregoing amendments can be found, for example, in at least the following locations in the original disclosure: Page 18, lines 12-15; page 30, lines 1-3; and the original claims.

OBJECTIONS TO THE SPECIFICATION

The title is objected to in paragraph 4 of the Official Action. By the present response, Applicants have amended the title in the manner which is believed to be more descriptive of the invention.

The specification stands objected to on the grounds set forth in paragraph 5 of the Official Action, as failing to provide proper antecedent basis for claimed subject matter. More specifically, the limitation appearing in claim 13 regarding the step of contacting a fuel and an oxidant to said anode is not supported by the specification. By the present response, Applicants have canceled claim 13, thereby rendering this objection moot.

CLAIM REJECTIONS UNDER 35 U.S.C. §112

Claims 13 and 14 stand rejected under 35 U.S.C. §112, second paragraph, on the grounds set forth in paragraph 7 of the Official Action.

By the present response, applicants have canceled claims 13-14 thereby rendering the above rejection moot.

CLAIM REJECTIONS UNDER 35 U.S.C. §101

Claim 14 stands rejected under 35 U.S.C. §101 on the grounds set forth in paragraph 9 of the Official Action.

By the present response, claim 14 has been canceled, thereby rendering the above rejection moot.

CLAIM REJECTIONS UNDER 35 U.S.C. §102

Claims 1, 5-7 and 10-14 stand rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent Application Publication No. 2002/0068215 to Hamada et al. (hereafter "*Hamada et al.*") on the grounds set forth in paragraph 11 of the Official Action. For at least the reasons noted below, this rejection should be withdrawn.

The present invention is directed to a fuel cell having an improved electrode construction. Conventional electrode structures suffer from poor diffusion of reaction products away from the electrode surface, among other deficiencies. The electrode structures of the present invention promote and facilitate the release of oxidation products, such as gaseous products, from an electrocatalyst on the surface of the electrode, thereby improving mass transport in reducing electrode polarization or over potential. Additional benefits derived from the present invention include more

versatile cell design based on thin, lightweight components, as well as a construction that allows low fuel concentrations to be used. A fuel cell constructed according to the principles of the present invention is set forth in amended claim 1. Amended claim 1 recites:

1. A fuel cell having an anode, a cathode and an electrolyte which is an ion exchange membrane, wherein the anode and cathode are immediately adjacent the electrolyte and wherein the anode comprises a wire mesh support of conductive material comprising strands defining pores and channels therebetween, and an electrocatalyst layer only on the strands leaving the pores and channels substantially uncovered.

Hamada et al. is directed to a gas diffusion layer for a fuel cell and a method of manufacturing the same. As evident, for example, from Figures 1 and 2 therein, a gas diffusion layer is formed by filling voids (21) of a mesh sheet (20), and by forming a catalyst layer (2) evenly on the upper portion of the gas diffusion layer (4). However, this construction clearly fails to anticipate the fuel cell defined by amended claim 1 above.

As evident from the above, amended claim 1 requires "an electrocatalyst layer only on the strands leaving the pores and channels substantially uncovered." In contrast, according to the construction of *Hamada et al.*, the pores or voids (21) of the mesh (20) are filled with conductive powder (22), and the catalyst layer is formed as a continuous layer over the surface of the filled mesh. This construction clearly fails to anticipate the construction set forth in amended claim 1 above.

Reconsideration and withdrawal of the rejection is respectfully requested.

The remaining claims dependent from claim 1. Thus, these claims are also distinguishable over *Hamada et al.* for at least the same reasons noted above.

Claims 1, 5-7, 10, 13 and 14 stand rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,558,948 to Doyon (hereafter "*Doyon*") on the grounds set forth in paragraph 12 of the Official Action. For at least the reasons noted below, this rejection should be withdrawn.

Doyon is directed to a fuel cell anode and fuel cell. It is alleged in the grounds for rejection that an electrode catalyst (2) is disposed on a porous support member or mesh (3). However, as evident from Figure 1, and further disclosed in lines 1-2 and 28-30 of column 3 therein, this construction clearly fails to anticipate the fuel cell recited in amended claim 1. This is because the cohesive member, or alleged catalyst (2) is a continuous sheet like member which is laminated to the support member, and as disclosed by *Doyon*, is embedded into the support member 3 thereby covering not only the surfaces of the support member itself, but also filling any voids present in the mesh. Such a construction runs contrary to the requirements of amended claim 1. Reconsideration and withdrawal of the rejection is respectfully requested.

The remaining claims depend from claim 1. Thus, these claims are also distinguishable over *Doyon* for at least the same reasons noted above.

Claims 1, 5, 10, 11, 13 and 14 stand rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 6,368,476 to DeMarinis et al. (hereafter "*DeMarinis et al.*") on the grounds set forth in paragraph 13 of the Official Action. For at least the reasons noted below, this rejection should be withdrawn.

DeMarinis et al. is directed to structures and methods for manufacture of gas diffusion electrodes and electrode components. Column 1, lines 18 to column 2, line 21 is cited as allegedly disclosing an electrode construction satisfying the

requirements of claim 1. Initially, it is noted that this portion of the *DeMarinis et al.* disclosure is directed to prior art constructions, and not the invention of *DeMarinis et al.* Nevertheless, nothing contained in the disclosure of *DeMarinis et al.* satisfies the requirements of amended claim 1. For example, a conventional gas diffusion electrode construction is described in lines 15-25 of column 1 of *DeMarinis et al.* This construction is described as including layers composed of a conductive support, such as a metal mesh, carbon cloth or carbon paper. Disposed thereon are a plurality of wet proofing layers and finally a catalytic layer applied to one face thereof. However, such a layered construction is a conventional type construction of the type set forth on page 4 of the present specification. Again, such a layered construction serves to completely obscure any pores or passages in the mesh support, thereby failing to satisfy the requirements of amended claim 1, and failing to provide the above-noted advantages and benefits associated with the construction of the presently claimed invention. Therefore, reconsideration and withdrawal of the rejection is respectfully requested.

The remaining claims rejected on the above-noted grounds are dependent from claim 1. Thus, these claims are also distinguishable over *DeMarinis et al.* for at least the same reasons noted above.

Claims 1, 5, 10, 11, 13 and 14 stand rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Patent Application Publication No. 2002/0150812 to Kaz et al. (hereafter "*Kaz et al.*") on the grounds set forth in paragraph 14 of the Official Action. For at least the reasons noted below, this rejection should be withdrawn.

Kaz et al. is directed to a method of production of multi-layer electrode or electrode assembly and gaseous diffusion electrodes. It is alleged in the grounds for

rejection that *Kaz et al.* discloses a construction, depicted in Figure 3 therein, that satisfies the requirements of claim 1. However, as clearly disclosed by *Kaz et al.*, the construction depicted in Figure 3 does not satisfy the requirements of amended claim 1. In fact, the teachings of *Kaz et al.* in this regard are completely inopposite to the requirements of amended claim 1. More specifically, as illustrated in Figure 3 therein, a mesh support (98) is provided with a continuous layer (100) and a barrier layer (102). Thus, the layer (100) is disposed over the entire upper surface of the mesh (98) thereby completely obstructing any pores or passages present in the mesh, contrary to the requirements of amended claim 1. For at least the reasons noted above, reconsideration and withdrawal of the rejection is respectfully requested.

The remaining claims rejected on these grounds depend from claim 1. Thus, these dependent claims are also distinguishable over *Kaz et al.* for at least the same reasons noted above.

CLAIM REJECTIONS UNDER 35 U.S.C. §103

Claims 8 and 9 stand rejected under 35 U.S.C. §103(a) as being unpatentable over *Hamada et al.* on the grounds set forth in paragraph 16 of the Official Action. For at least the reasons noted below, this rejection should be withdrawn.

It is alleged in paragraph 16 of the Official Action that it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify *Hamada et al.* to include a plurality of layers of mesh, and to provide adjacent layers oriented at an angle to one another. However, nothing that is alleged in paragraph 16 of the Official Action serves to cure the deficiencies previously noted

above in connection with the teachings of *Hamada et al.* compared to the requirements of amended claim 1.

Claims 8 and 9 stand rejected under 35 U.S.C. §103(a) as being unpatentable over *Hamada et al.* in view of U.S. Patent No. 3,835,514 to Pollack (hereafter "*Pollack*") on the grounds set forth in paragraph 16 of the Official Action. For at least the reasons noted below, this rejection should be withdrawn.

It is alleged in paragraph 17 of the Official Action that *Pollack* teaches a plurality of laminated metallic fibrous sheets, in layers of parallel arrays of fibers running at an orientation angle between 30° and 90° from the longitudinal direction thereof. However, even if the alleged teachings of *Pollack* were applied to *Hamada et al.* exactly as suggested in the grounds for rejection, the claimed invention would not result. Namely, the alleged teachings of *Pollack* fail to cure the deficiencies previously noted above in connection with the teachings of *Hamada et al.* with respect to the requirements of amended claim 1. Therefore, reconsideration and withdrawal of the rejection is respectfully requested.

CONCLUSION

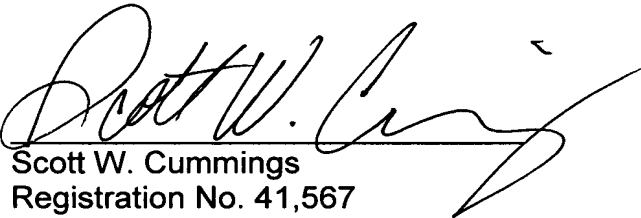
From the foregoing, further and favorable action in the form of a Notice of Allowance is earnestly solicited. Should the Examiner feel that any issues remain, it is requested that the undersigned be contacted so that any such issues may be adequately addressed and prosecution of the instant application expedited.

Respectfully submitted,

BUCHANAN INGERSOLL & ROONEY PC

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